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Loess is one of the most common geologic materials found on the land surface in the Midwest. This can also be said for the lower Mississippi Valley, the Palouse district of eastern Washington, central and eastern Europe, the Ukraine of southwestern Russia and eastern China. The word itself is German in origin, and as late as the 1860s was regarded as a provincial name for deposits along the Rhine Valley. Loess, glacial history, native grasslands and productive agricultural regions are linked together across the mid-latitudes of the northern hemisphere.

In Iowa, this wind-deposited sediment of silt-sized quartz grains was deposited over ice-free landscapes as continental glaciers melted to the north. The valley of the Missouri River, which carried this glacial outwash, was the source of the sediment. Its floodplain was wide, and its braided river channel was clogged during low-flow seasons with exposed bars of flood-spilled sediment. The winnowed silts were blown from the valley and deposited downwind. The thickest and coarsest deposits accumulated in western Iowa, immediately adjacent to the great valley. The loess reached thicknesses of 100 feet or more as it buried the pre-existing land surface and became the dominant element of the terrain in this region.

The loess was anchored first by coniferous then deciduous forests, and eventually, as the post-glacial climate continued to warm, by the prairie. Kneaded by the deep root systems of prairie plants and

The spine-leafed yucca blooming along this steep side slope is one of the unusual prairie plants that thrives in the dry habitat among the peaks and saddles of the Loess Hills Nature Preserve in Monona County. This classic association of topography and ecology is part of the recently designated National Natural Landmark.

associated organisms, watered and baked, frozen and thawed by seasonal climatic patterns during the last few thousand years, the upper several feet of these deposits were transformed into some of the world's most fertile soils.

Today in western Iowa, extending north-south along the bluffs which border the Missouri Valley, is a narrow band of rough, corrugated terrain covered with a ragged cloak of unkempt plants that seems out of place in the state's otherwise meticulously manicured landscape. In 1986, nearly 10,000 acres of this land were selected by the U.S. Department of Interior, National Park Service as a nationally significant example of landscapes dominated by loess. Visitors to the Loess Hills of western Iowa have an opportunity to see, on a scale rarely seen among the world's landforms, deposits of wind-blown silt that accumulated in sufficient thicknesses to have obscured the older relief and contributed their own distinctive signature to the landscape. The

Loess Hills region is a place to appreciate the geologic process responsible for the parent materials which accounts for nearly 40 percent of our state's soil types. It is a place to see the steep faces of the deep, fine-textured geologic deposit whose form elsewhere is usually lost against the more bulky underpinnings of earlier ice-deposited materials or even older bedrock foundations. It is a place to examine the special topographic forms that subsequent erosion carved from the uniform, porous silt. It is the first place where today's west-bound, cross-country travellers can see a hint of the extensive native grassland habitats that once dominated the heartland east to the Ohio border. Only scattered, stamp-sized remnants remain east of Iowa's Loess Hills.

In a state dominated by agriculture, it is important to retain some reminders of the geological and biological systems which made this land so productive. The Loess Hills have protected themselves in the sense that their ruggedness and steeply pitched slopes have kept them relatively isolated from the cropland which surrounds them on all sides. Their protection has been assisted by the establishment of three state parks--Stone, Preparation Canyon and Waubonsie--and several smaller county conservation areas. A concerted effort during the past 10 to 12 years by private conservation organizations, college and university research projects and the state preserves and natural resources programs has made valuable progress toward the inventory, protection and interpretation of this unusual natural area.

The designation of portions of the Loess Hills as a National Natural Landmark adds important federal recognition to these significant landscapes and habitats. The Landmarks Program includes select portions of America's land and waters--an array of landforms, geological features, habitats and plant and animal communities that constitute the best examples of the nation's natural history. The objectives of this program are four-fold: 1) to encourage preservation of sites which illustrate the geological and ecological character of the United States; 2) to enhance the educational and scientific value of sites preserved; 3) to strengthen the cultural appreciation of natural history; and 4) to foster greater concern in the conservation of the nation's natural heritage. The designation does not affect land ownership, nor does it restrict the use of the land. Landowners are encouraged, however, to adopt sound conservation practices in the use, management, and protection of the property in order to preserve its significant qualities.

National Natural Landmark designation of the Loess hills includes two separate tracts in the heart of the deep-loess country. The Turin site occupies a wedge-shaped parcel of 7,440 acres in central Monona County between the Missouri/Little Sioux Valley on the west and the Maple River valley on the east and south. Approximately 30 percent of the area consists of large, interconnected prairies, much of it included in the state-owned Loess Wildlife Area and Loess Hills Nature Preserve. The second tract is the Little Sioux-Smith Lake site, a 2,980-

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The rough-textured Loess Hills in southern Monona County contrast sharply with the cultivated Missouri Valley and the channelized Little Sioux River. Thick, wind-deposited loess was carved by erosion into intricate landscapes of alternating ridges and troughs.

acre parcel in northern Harrison County between the Soldier River valley and the Missouri/Little Sioux floodplain. This site is associated with a long history of scientific investigation of the loess and associated Quaternary deposits, and also has considerable support among local landowners interested in protecting the hills.

The Iowa Department of Natural Resources has recently launched a major land-acquisition project to establish the Loess Hills Pioneer State Forest in Harrison and Monona Counties. Pioneer is the right word. Prairie was the prevailing vegetative cover on the Loess Hills 100 years ago. As settlement took place in western Iowa, prairie fires, which are an important element in the maintenance of this ecosystem, were suppressed. Trees from the more moist and protected backslopes and ravines have spread quickly into the grasslands, to the extent that these "pioneering" woodlands have been proposed as a state forest.

The Loess Hills are foremost a topographic form developed in thick deposits of coarse silt. While they originated as a wind-blown deposit between 30,000 and 14,000 years ago, they are equally a product of fluvial erosion. The modern landscape is a product of several episodes of gully cutting and filling during the last 25,000 years. The steep hillslopes and intricately dissected terrain are related to both the extreme erodibility of the loess and yet its great apparent cohesiveness when dry, as well as the inherent cleavage planes that extend vertically through the deposits. The steepness of the topography, the permeability of the loess and high density of deeply incised drainageways contribute to strong contrasts in soil moisture and temperature. These conditions produce specialized habitats for an interesting variety of plant and animal communities.

This association of exceptionally thick loess, unique topography and specialized habitats is a classic example of the geologic-ecologic themes that the National Natural Landmarks Program strives to recognize. No better example of these associated features exists within the tens of thousands of square miles of loess-covered landscapes in the midwestern United States than in western Iowa's Loess Hills.

This article is reprinted from the 1987 issue of Iowa Geology. *It is one of 10 articles from this one issue which are of general interest and particular classroom use to Iowa teachers. Iowa geology is published once each year by the Iowa Department of Natural Resources. It is edited by Jean Prior, who is known for her excellent presentations to teachers. Teachers may be added to the mailing list to receive* Iowa Geology *(no charge) by sending a request to Prior at the Geological Survey Bureau, 123 North Capitol Street, Iowa City, Iowa 52242.*